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SPECIAL SCIENTIFIC REPORT–WILDLIFE No. 36

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SPECIAL SCIENTIFIC REPORT--WILDLIFE NO. 36

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WATERFOWL BANDING IN THE CANADIAN PRAIRIE PROVINCES

By Seth H. Low

For purposes of management, the waterfowl population within the United States is divided into four units, or flyways. Estimates of numbers of birds available during the fall migration period are necessary for the purpose of setting the annual shooting regulations. Data, upon which fall flight estimates are based, are gathered by means of aerial surveys of breeding areas in Canada, Alaska, and the northern portion of the United States. Unfortunately, breeding areas for each flyway are not separate and distinct. Rather, many areas supply birds to two or three flyways, and some to all four. One of the major weaknesses in the present forecasts of fall flight in each of the flyways is lack of knowledge of the proportion of birds which move to each of the flyways from various units of the breeding range.

Large-scale banding is the method used to solve the problem of distribution from breeding areas, and priority has been given to the more important areas. Surveys of all major duck-breeding areas have amply demonstrated that the southern portions of the Provinces of Alberta, Saskatchewan, and Manitoba can truly be called the "duck factory" of North America. In 1956, for example, it was estimated that 56 percent of the total breeding population of ducks nested in this region.

The first organization to band large numbers of ducks in the Prairie Provinces was Ducks Unlimited. From 1939 through 1948, that organization banded approximately 56,000 birds at about 50 banding locations mostly in the southern portions of the three Provinces. Beginning in 1947, the U. S. Fish and Wildlife Service, the Canadian Wildlife Service, and the Provincial Game Branches organized cooperative banding crews for banding during the summer months. During the summer of 1954, the U. S. Fish and Wildlife Service increased its efforts considerably and also enlisted the cooperation of a number of States. During the summer of 1956, over 60 men took part in the cooperative banding effort in the three Prairie Provinces.

Between 1939 and 1954, a good portion of the birds banded in the Prairie Provinces were caught either at molting areas by drive crews, or at late-summer or early-fall concentration points by means of bait-trapping. As data accumulated, it became apparent that many birds moved into these concentration areas from unknown points over long distances. This being the case, birds banded at

these points were not representative of birds which nested or were raised in the vicinity. Since the problem was one of determining the distribution of the populations measured by the breeding-ground survey within each stratum, there was strong doubt whether banding at concentration points was providing the necessary information.

Beginning in 1954, therefore, the emphasis was shifted to the banding of ducklings before they reached the flying stage, and banding of brood females. Although greater effort was required to catch this class of bird, there was no question that the birds were representative of the area in which they were banded.

Other difficulties experienced through the years have been inconsistencies in aging and sexing birds, and the manner in which age data have been recorded. Cloacal examination was not generally used during the early years for aging and sexing the birds.

The terminology for ages was vague and loosely applied. Particularly confusing was the designation "juvenal." It was applied to young birds of the year, both before they were on the wing and long afterwards. To clarify this, the terminology was changed and made more definite in 1949. The term "local" was applied to young birds, banded before they could fly, which could safely be presumed to be still in the immediate vicinity of their nests. The term "immature" was applied to all other birds banded during the year in which they were hatched. To birds banded on or after the first of the year and recognizable as hatched during the preceding calendar year, the term "subadult" was applied.

Although these terms were precise and ideally suited for the numeric coding system (IBM) of the Banding Office, waterfowl banders were slow in adopting them. The designation "local" was not consistently used by all banders in the three Provinces until 1954. Since the banding of "locals" was first emphasized in 1954, and since there is some confusion among the records prior to 1954 regarding age designation of the birds, major emphasis in this report is given to bandings and recoveries during the period 1954 through 1956. Among the records in the files for the period prior to 1954, there are some instances where it is obvious that either the term "local" or the term "juvenal" had been applied to ducklings before they reached the flying stage. Records of this type have been included with the summaries of recoveries of "locals" from 1954 and 1955 bandings. It should be mentioned that the task of transferring hunter reports of bands recovered to IBM cards is a lengthy one and that data from the 1956-57 hunting season were not available at the time this report was written.

The prairie breeding area

The waterfowl breeding grounds on the prairies of southeastern Alberta, southern Saskatchewan, and southwestern Manitoba are confined mainly within a block bounded on the north and south by the latitude lines 49° and 54° North and on the east and west by the longitude lines 98° and 114° West. Within this block the habitat has been divided into strata for the purpose of more efficient sampling when conducting the aerial breeding-population and production surveys. Stratification was based on differences in the variability characteristics of the data, which is generally related to population density, and on the relative importance of each stratum as measured by the size of the population present.

Figure 1 shows the general location of the strata; the following list gives the area and general habitat type of each stratum:

	Square miles	Habitat type
Alberta:		
Stratum A.....	22,088	Tall-grass prairie.
Stratum B.....	26,100	Parkland.
Stratum C.....	16,112	Short-grass prairie.
Total.....	64,300	
Saskatchewan:		
Stratum A-West..	36,630	Tall-grass prairie.
Stratum A-East..	14,600	Parkland.
Stratum B-West..	20,448	Parkland.
Stratum B-East..	30,072	Parkland.
Stratum C.....	11,290	Short-grass prairie.
Total.....	113,040	
Manitoba:		
Stratum A.....	10,368	Parkland.
Stratum B.....	28,600	Parkland.
Total.....	38,968	
Grand Total..	216,308	

Figure 1. Location of Waterfowl Breeding Population Strata in Canadian Prairies and Management Flyways of the United States

Estimates of breeding populations and production success are available for each of these strata. The problem is one of determining what proportion of the population in each stratum moves to each of the four flyways in the United States.

Distribution of banding effort

Beginning in 1954 the banding crews were deployed with an objective of obtaining a sample of "locals" distributed in proportion to the relative number of birds within each of the strata. Top priority was placed on the banding of Mallards. This was done for two reasons. First, the Mallard is the most important species on the continent so far as hunters are concerned. Second, Mallard ducklings are difficult to catch--many broods will leave the water as soon as a banding crew approaches a pothole and will cover surprising distances cross-country. Unless special methods are employed, it is believed that several of the less-important but more easily banded species would make up most of the banded sample.

The objective of distributing the banded sample throughout the prairie breeding areas has met with varying success. In parkland-type habitat "locals" of several species are difficult to catch, particularly Mallards. Road conditions have limited activities in some locations. For the purpose of illustrating the distribution of the "locals" which have been banded, the prairie breeding area has been divided into 80 one-degree blocks of latitude and longitude. Grids 1, 2, and 3 present the cumulative total of recoveries from each degree block. Areas which are undersampled will be emphasized during the 1957 banding operations.

Summaries of bandings

Tables 1A, 1B, and 1C summarize, by age and sex, all bandings of waterfowl in the Provinces of Alberta, Saskatchewan, and Manitoba during the calendar years 1954, 1955, and 1956.

Table 2 shows the total bandings (age and sex lumped) by years for each species in the three Provinces. From this table it will be seen that the total waterfowl of all species and of all ages and sexes banded in the three Provinces together has varied little from year to year: 1954 - 26,583; 1955 - 26,257; 1956 - 27,846; Total - 80,686. The bandings by individual Province and by species, however, have been quite different from year to year. Substantial increases in some species in 1956 in Saskatchewan were offset by decreases in Manitoba and Alberta.

The objective of most of the banding effort of the past 3 years has been primarily the banding of Mallard "locals" and secondarily, the banding of "locals" of other species. Table 3 itemizes the banding of "locals" by Province, year, and species. As desired, Mallards have been banded in the largest numbers, followed by Pintail and Blue-winged Teal.

Summaries of recoveries

The objective of this report is to analyze appropriate banding data to ascertain what proportion of the waterfowl produced in each stratum (fig. 1) was harvested by hunting in each of the 4 flyway management areas, as well as both north and south of the United States. To accomplish this, only birds classed as "locals" were considered to be representative of the various strata. Also, only the direct, first fall and winter recoveries were considered to be pertinent to the problem.

The procedure was to consider the total number of pertinent recoveries of birds banded in each of the strata as representing 100 percent and determine the percentage recovered in each of 6 areas: The 4 flyway areas within the continental United States (fig. 1), all areas north of the United States (Alaska and Canada), and all areas south of the United States (Bermuda, West Indies, Mexico, Central and South America, and the islands in the Pacific).

Table 4 includes all direct recoveries which have accumulated from all bandings in the areas listed up through the summer of 1955. Where there were very few data for a species for a stratum, that stratum has been omitted from the table. In a few cases, all the data for a Province as a whole have been lumped together.

Table 5 shows the number of wild "locals" banded and the direct, first-season recoveries reported from these bandings, and the percentage that these reported recoveries are of the number banded. It will be noted that the first-year report rate for direct recoveries of local Mallards, Gadwalls, and Baldpate is only 9 to 10 percent; for Green-winged Teal, Shoveler, and Pintail, 5 to 6 percent; for Blue-winged Teal, about 2.5 percent; for Canvasback, 22 to 28 percent; and for Redhead, 17 or 18 percent.

Recovery data for all birds other than "locals" banded in the Prairie Provinces are not summarized in this report.

In grids 1, 2, and 3 it will be noted that a large number of "locals" have been banded in the degree block whose coordinates at the southeast corner are 51° North and 109° West. In addition to recoveries from bandings in 1954 and 1955, 28 and 53 recoveries of

"local" Mallards are available from this degree block for the years 1952 and 1953, respectively. The distribution of recoveries of "local" Mallards from degree block 51° - 109° is presented in table 6.

Section A of table 6 gives the percentages taken in Canada and each of the flyway areas based on the total direct recoveries for each year. In sections B and C the percentages are figured on the basis of only the recoveries taken within the United States.

Discussion

The data presented in table 4 were used for the first time when making the 1956 fall-flight forecast. Although it is difficult to determine the additional accuracy attained through use of these data, there are considerable changes between these data and the rough approximations of distribution to the flyways that were available for use during prior years. There is every reason to believe, therefore, that considerable gain has been made.

As information accumulates, it is not unusual for complications to arise; the problem of determining distribution from breeding areas to the four flyways is an example. If breeding ground survey data are to be used to predict changes in the size of fall flight in each of four flyways, the distribution to the four flyways from specific portions of the breeding grounds must be predictable in advance. In order for distribution to be predictable, it must be reasonably similar from one year to the next. Although individual birds are generally considered to follow rather fixed patterns of migration from one year to the next, the waterfowl-banding data seem to show that variations occur. Recoveries of "locals" banded in degree block 51° - 109° can be used to illustrate this variation.

In table 6 it is evident that there are fluctuations from year to year in the percentages of birds taken in Canada, and in the percentages taken in each flyway, particularly the Central and the Mississippi. As a means of examining these fluctuations, grids have been constructed showing the distribution of direct recoveries by latitude and longitude for the years 1954 and 1955 (grids 4 and 5). The overall pattern of distribution is similar for both, but there are differences in the distribution of recoveries along the flight lanes between the two years.

Considering the east-west components only, it appears that the proportion going each way was approximately the same:

	Westward	Same area	Eastward
1954	9.0%	28.7%	62.3%
1955	8.6%	31.8%	59.6%

Breaking down the westward shift by 5 units shows a variation in where the kill took place as follows:

	110°-115°	115°- 120°	120°-Pacific Ocean
1954	1.6%	4.1%	3.3%
1955	4.1%	2.0%	2.5%

The variation in harvest along the east flight is more evident:

	110°-105°	105°-100°	100°-95°	95°-90°	90°-85°	85°-80°	80°-Atlantic Ocean
1954	2.5%	5.8%	21.3%	27.0%	3.3%	0.8%	1.6%
1955	8.6%	9.6%	14.6%	21.7%	4.1%	1.0%	0.0%

From north to south there is also a significant difference:

	1954		1955	
49° - North	29.5%	29.5%	37.9%	37.9%
44° - 49°	11.5%	41.0%	12.6%	50.5%
39° - 44°	23.8%	64.8%	31.3%	81.8%
34° - 39°	16.4%	81.2%	11.6%	92.4%
28° - 34°	18.8%	100.0%	6.6%	100.0%

By the above approach it is easy to see the difference between the two years and to make a correlation with the weather and other factors.

The same data by flyway areas give the following:

	North	Pacific	Central	Mississippi	Atlantic
1954	29.5%	8.2%	32.8%	27.0%	2.5%
1955	37.9%	5.6%	24.7%	31.8%	0.0%

This breakdown by flyway areas shows that there was a reversal in the proportions taken in the Central and Mississippi areas between the two years, but it is not immediately evident why. From the grids it is evident that the main flight both years was southeastward from Saskatchewan across the Dakotas (Central area) into Illinois (Mississippi area) and then south into Texas (Central area). The heavier kill in the Central area in 1954 was the result of the ducks migrating farther and crossing from the Mississippi area back into the Central area.

While the movement of the ducks was similar in both years, there are notable differences in when and where the ducks were harvested along the way. A greater portion of the birds moved farther and faster in 1954 than in 1955. This apparently accounted for the difference between the years in the proportion taken in Canada and the proportion taken in the Central as compared with the Mississippi Flyway. It appears, therefore, that distribution to the four flyways is not entirely predictable. However, it is evident that weather during the fall migration period is the controlling factor. Freezing weather arrived unusually early in the prairie portions of Canada and the United States during the fall of 1954, while the fall of 1955 was extremely mild. Whereas the bulk of the waterfowl population leave the Canadian prairies before mid-November in an average fall, large numbers were still present during mid-December of 1955 and a fair number actually wintered there. It would seem that the years 1954 and 1955 have presented the extremes of weather conditions that are likely to be encountered and that during most years the differences in distribution may be less.

The fact that differences occur points to the necessity of obtaining samples of banded birds within each of the important breeding areas for a series of years in order to arrive at an average expectancy of distribution. For example, if our banding had been done entirely in 1954, our measure of distribution would have been considerably in error during 1955 and somewhat in error during a year with average fall weather. An average of data from 1954 and 1955 would be less in error with regard to either an early or a late year phenologically, and might be quite close during a normal year. Although it is difficult to assess at this point, it seems likely that banding data from 4 or 5 years should be obtained from each of the important breeding areas before the data can be considered satisfactory.

TABLE 1A.--ALBERTA BANDINGS, 1954, 1955 and 1956 - WILD AND WILD EXP.*

	Locals				Immatures				Adults				Unknown	Totals
	♂	♀	X	T	♂	♀	X	T	♂	♀	X	T		
Mallards														
1954	480	518	14	1012	41	49	0	90	304	85		389		1491
1955	301	254	7	562	0	0	0	0	226	66		292		854
*1956	357	325	0	682	6	2	0	8	96	89		185	1	876
Sub	1138	1097	21	2256	47	51	0	98	626	240		866	1	3221
Gadwall														
1954	34	33		67					1	7		8		75
1955	105	116		221					0	2		2		223
1956	48	53		101	2	1	0	3	6	1		7		111
Sub	187	202		389	2	1	0	3	7	10		17		409
Baldpate														
1954	137	123		260					94	5		99		359
1955	287	213		500					355	3		358		858
1956	196	170		366	0	2	0	2	171	10		181		549
Sub	620	506		1126	0	2	0	2	620	18		638		1766
Green-winged Teal														
1954	45	32		77	10	16	0	26	89	17		106		209
1955	102	55	1	158	0	1		1	71	25		96		255
1956	30	33	0	63		2	0	2	91	15		106		171
Sub	177	120	1	298	10	19	0	29	251	57		308		635
Blue-winged Teal														
1954	345	390		735	1	0	1	2	733	154		887		1624
1955	861	718	26	1605					440	125	5	570		2175
1956	307	301		608		1	1	2	785	149		934		1544
Sub	1513	1409	26	2948	1	1	2	4	1958	428	5	2391		5343
Shoveler														
1954	338	409		747	23	29		52	6	11		17		816
1955	388	424		812					5	7		12		824
1956	218	209		427						2		2		429
Sub	944	1042		1986	23	29		52	11	20		31		2069

* Wild experimental means birds trapped as wild but treated in some unusual way such as color marking.

X Means sex unknown.

TABLE 1A(CON'T.).--ALBERTA BANDINGS, 1954, 1955 and 1956 - WILD AND WILD EXP.*

	Locals				Immatures				Adults				Unknown	Totals
	♂	♀	X	T	♂	♀	X	T	♂	♀	X	T		
Pintail														
1954	534	504	7	1045	284	311		595	817	427		1244	100	2984
1955	619	498	23	1140	0	0	0	0	1001	611		1612	0	2752
1956	356	361	0	717	5	3	0	8	694	561		1255	1	1981
Sub	1509	1363	30	2902	289	314	0	603	2512	1599		4111	101	7717
Redhead														
1954	7	4	0	11	0	1	0	1	0	3		3		15
1955	8	14	0	22	0	0	0	0	0	0		0		22
1956	23	24	0	47	0	0	0	0	0	12		12		59
Sub	38	42	0	80	0	1	0	1	0	15		15		96
Canvasback														
1954	9	8		17					0	2		2		19
1955	1	6		7					1	1		2		9
1956	25	26		51					0	1		1		52
Sub	35	40		75					1	4		5		80
Scaups														
1954	11	9	0	20	11	31	0	42	36	34	0	70		132
1955	83	81	0	164	0	0	0	0	1	5	0	6		170
1956	7	4		11	0	0	0	0	2	10		12		23
Sub	101	94	0	195	11	31	0	42	39	49	0	88		325
Ring-necked Duck														
1954	0	0	0	0	0	0	0	0	2	0	0	2		2
1955	5	4	0	9					3	0	0	3		12
1956	0	0	0	0					2	0	0	2		2
Sub	5	4	0	9	0	0	0	0	7	0	0	7		16
Bufflehead														
1954	3	0	0	3										3
Sub	3	0	0	3										3
W-winged Scoter														
1954	2	9	0	11										11
1956	0	0	0	0					0	1	0	1		1
Sub	2	9	0	11					0	1	0	1		12

TABLE 1A(CON'T.).--ALBERTA BANDINGS, 1954, 1955 and 1956 - WILD AND WILD EXP.*

	Locals				Immatures				Adults				Unknown	Totals
	♂	♀	X	T	♂	♀	X	T	♂	♀	X	T		
Ruddy Duck														
1954	7	0	0	7					1	0	0	1	0	8
1955	0	1	0	1										1
1956	0	1	0	1					1			1	0	2
Sub	7	2	0	9					2	0	0	2	0	11
Canada Goose														
1954	11	6	0	17						3	0	3	0	20
1955	29	23	0	52					4	2		6		58
1956	34	25	0	59					1	1	0	2		61
Sub	74	54	0	128					5	6	0	11	0	139
Coot														
1954	6	0	8	14					3	0	23	26		40
1955	0	0	29	29					0	0	3	3		32
1956	0	0	79	79					0	0	18	18	9	106
Sub	6	0	116	122					3	0	44	47	9	178
Trumpeter Swan														
1955	18	11	0	29					1	0	0	1	0	30
				12,566				834				8,539		22,051

TABLE 1B.--SASKATCHEWAN BANDINGS, 1954, 1955 and 1956 - WILD AND WILD EXP.*

	Locals				Immatures				Adults				Unknown	Totals
	♂	♀	X	T	♂	♀	X	T	♂	♀	X	T		
Mallard														
1954	1508	1458	9	2975	38	34	4	76	345	289	2	636	28	3715
1955	1291	1174	5	2470	77	10	0	87	118	140	4	262	216	3035
1956	1997	1883	6	3886	464	158	4	626	1132	344	0	1476	33	6021
Sub	4796	4505	20	9331	579	202	8	789	1595	773	6	2374	277	12,771
Black Duck														
1955	0	0	0	0	0	0	0	0	2	0	0	2	0	2
1956	0	0	0	0	0	0	0	0	1	0	0	1	0	1
Sub	0	0	0	0	0	0	0	0	3	0	0	3	0	3
Gadwall														
1954	61	55	0	116	1	3	1	5	7	2	0	9		130
1955	235	222	0	457					1	7	0	8		465
1956	52	65	0	117	2	1	0	3	12	6	0	18	1	139
Sub	348	342	0	690	3	4	1	8	20	15	0	35	1	734
Baldpate														
1954	202	157	0	359	7	8		15	135	24	0	159		533
1955	366	300	0	666					9	16	0	25		691
1956	281	251	1	533	1	1	0	2	120	31	0	151	1	687
Sub	849	708	1	1558	8	9	0	17	264	71	0	335	1	1911
Green-winged Teal														
1954	24	14	0	38	1	0	2	3	489	64		553		594
1955	30	31	0	61					247	49		296		357
1956	51	59	2	112					1183	31		1214		1326
Sub	105	104	2	211	1	0	2	3	1919	144		2063		2277
Blue-winged Teal														
1954	381	305	1	687	30	47		77	1662	332	0	1994		2758
1955	928	870	1	1799	0	1	0	1	637	208	0	845	4	2649
1956	1119	1070	0	2189	14	10	0	24	1771	154	0	1925		4138
Sub	2428	2245	2	4675	44	58	0	102	4070	694	0	4764	4	9545

* Wild experimental means birds trapped as wild but treated in some unusual way such as color marking.

X Means sex unknown.

TABLE 1B(CON'T.).--SASKATCHEWAN BANDINGS, 1954, 1955 and 1956 - WILD AND WILD EXP.*

	Locals				Immatures				Adults				Unknown	Totals
	♂	♀	X	T	♂	♀	X	T	♂	♀	X	T		
Cinnamon Teal														
1954	3	0	0	3										3
Sub	3	0	0	3										3
Shoveler														
1954	323	293	1	617	0	0	0	0	19	32	0	51		668
1955	386	363	0	749	0	0	0	0	21	28	0	49		798
1956	346	347	0	693	0	0	0	0	29	10	0	39		732
Sub	1055	1003	1	2059	0	0	0	0	69	70	0	139		2198
Pintail														
1954	835	756	2	1593	4	6	1	11	1115	837	0	1952	55	3611
1955	433	446	2	881	80	136	2	218	4538	181	0	4719		5818
1956	532	544	1	1077	1	0	0	1	3891	877	0	4768		5846
Sub	1800	1746	5	3551	85	142	3	230	9544	1895	0	11,439	55	15,275
Redhead														
1954	15	18	0	33	0	0	0	0	40	35		75		108
1955	35	34	0	69	0	0	0	0	2	4		6		75
1956	28	20	0	48	1	1	0	2	9	9		18		68
Sub	78	72	0	150	1	1	0	2	51	48		99		251
Canvasback														
1954	19	17	0	36	0	0	0	0	2	3	0	5	0	41
1955	44	34	1	79	0	0	0	0	0	1	0	1	0	80
1956	52	53	1	106	0	0	0	0	0	6	0	6	0	112
Sub	115	104	2	221	0	0	0	0	2	10	0	12	0	233
Scaups														
1954	7	10	0	17	2	2	0	4	0	1	0	1	0	22
1955	140	169	0	309	0	0	0	0	10	4	0	14	0	323
1956	70	76	0	146	2	3	0	5	19	12	0	31	0	182
Sub	217	255	0	472	4	5	0	9	29	17	0	46	0	527
Ruddy Duck														
1956	0	5	0	5					0	3	0	3		8
Sub	0	5	0	5					0	3	0	3		8

TABLE 1B.(CON'T.).--SASKATCHEWAN BANDINGS, 1954, 1955 and 1956 - WILD AND WILD EXP.*

	Locals				Immatures				Adults				Unknown	Totals
	♂	♀	X	T	♂	♀	X	T	♂	♀	X	T		
Ring-necked Duck														
1954									5			5		5
1955	4	0	0	4	0	0	0	0	1	0	0	1		5
1956	10	5	0	15	0	0	0	0	23	1	0	24		39
Sub	14	5	0	19	0	0	0	0	29	1	0	30		49
Bufflehead														
1955	0	0	0	0	0	0	0	0	2	1	0	3		3
1956	0	1	0	1	0	0	0	0	0	0	0	0		1
Sub	0	1	0	1	0	0	0	0	2	1	0	3		4
Canada Goose														
1954	2	3	0	5					117	119	0	236	7	248
1955	0	0	0	0	6	11	0	17	3	1	0	4		21
1956	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub	2	3	0	5	6	11	0	17	120	120	0	240	7	269
Coot														
1954	0	0	12	12	0	0	0	0	0	0	34	34	81	127
1955	0	1	184	185	0	0	0	0	0	0	50	50	0	235
1956	0	0	25	25	0	0	0	0	0	0	20	20	0	45
Sub	0	1	221	222	0	0	0	0	0	0	104	104	81	407
Saskatchewan			23,173				1,177				21,689		426	46,465
Alberta			12,566				834				8,539		111	22,050
Manitoba			2,738				6,394				3,001		38	12,171
			38,477				8,405				33,229		575	80,686

TABLE 1C.--MANITOBA BANDINGS, 1954, 1955 and 1956 - WILD AND WILD EXP.*

	Locals				Immatures				Adults				Unknown	Totals
	♂	♀	X	T	♂	♀	X	T	♂	♀	X	T		
Mallard														
1954	61	68	7	136	354	441	0	795	335	127	0	562	0	1393
1955	86	95	0	181	127	176	0	303	101	115	0	216	0	700
1956	80	65	0	145	171	120	0	291	450	159	0	609	0	1045
Sub	227	228	7	462	652	737	0	1389	886	401	0	1287	0	3138
Black Duck														
1954	0	0	0	0	0	0	0	0	3	2	0	5	0	5
1955	0	0	0	0	0	0	0	0	2	0	0	2	0	2
1956	0	0	0	0	0	1	0	1	2	2	0	4	0	5
Sub	0	0	0	0	0	1	0	1	7	4	0	11	0	12
Gadwall														
1954	20	17	0	37	0	0	0	0	4	4	0	8	0	45
1955	22	11	0	33	1	1	0	2	4	5	0	9	0	44
1956	5	2	0	7	1	1	0	2	0	0	0	0	0	9
Sub	47	30	0	77	2	2	0	4	8	9	0	17	0	98
Baldpate														
1954	27	21	0	48	10	5	0	15	24	14	0	38	0	101
1955	32	23	0	55	1	1	0	2	9	5	0	14	0	71
1956	34	34	0	68	0	3	0	3	0	2	0	2	0	73
Sub	93	78	0	171	11	9	0	20	33	21	0	54	0	245
Green-winged Teal														
1954	8	11	0	19	2	10	0	12	9	9	0	18	0	49
1955	1	1	0	2	15	16	0	31	11	8	0	19	0	52
1956	6	6	0	12	2	1	0	3	0	1	0	1	0	16
Sub	15	18	0	33	19	27	0	46	20	18	0	38	0	117
Blue-winged Teal														
1954	91	72	0	163	368	369	0	737	45	31	0	76	5	981
1955	242	225	0	467	212	313	0	525	65	28	0	93	0	1085
1956	183	176	0	359	109	144	0	253	46	25	0	71	0	683
Sub	516	473	0	989	689	826	0	1515	156	84	0	240	5	2749

* Wild experimental means birds trapped as wild but treated in some unusual way such as color marking.

X Means sex unknown.

TABLE 1C(CON'T.).--MANITOBA BANDINGS, 1954, 1955 and 1956 - WILD AND WILD EXP.*

	Locals				Immatures				Adults				Unknown	Totals
	♂	♀	X	T	♂	♀	X	T	♂	♀	X	T		
Cinnamon Teal														
1955	0	0	0	0	0	0	0	0	0	1	0	1	0	1
Sub	0	0	0	0	0	0	0	0	0	1	0	1	0	1
Shoveler														
1954	22	18	0	40	22	39	0	61	0	2	0	2	0	103
1955	37	39	0	76	7	4	0	11	4	1	0	5	0	92
1956	8	14	0	22	0	1	0	1	0	0	0	0	0	23
Sub	67	71	0	138	29	42	0	73	4	3	0	7	0	218
Pintail														
1954	8	13	0	21	606	1256	1	1863	63	96	0	159	0	2043
1955	11	9	0	20	111	308	0	419	27	33	0	60	0	499
1956	11	18	0	29	46	44	0	90	7	11	0	18	0	137
Sub	30	40	0	70	763	1608	1	2372	97	140	0	237	0	2679
Wood Duck														
1954	0	0	0	0	0	0	0	0	1	0	0	1	0	1
Sub	0	0	0	0	0	0	0	0	1	0	0	1	0	1
Redhead														
1954	71	54	0	125	180	167	1	348	194	248	0	442	0	915
1955	35	44	0	79	61	39	0	100	79	205	0	284	0	463
1956	53	65	0	118	71	44	0	115	4	87	0	91	0	324
Sub	159	163	0	322	312	250	1	563	287	540	0	817	0	1702
Canvasback														
1954	76	67	0	143	29	32	1	62	22	40	0	62	0	267
1955	28	20	0	48	11	9	0	20	19	20	0	39	0	107
1956	7	16	0	23	0	1	0	1	2	12	0	14	0	38
Sub	111	103	0	214	40	42	1	83	43	72	0	115	0	412
Scaups														
1954	36	35	0	71	0	0	0	0	44	27	0	71	0	142
1955	10	9	0	19	1	0	0	1	1	6	0	7	0	27
1956	2	5	0	7	0	0	0	0	0	1	0	1	0	8
Sub	48	49	0	97	1	0	0	1	45	34	0	79	0	177

TABLE 1C(CON'T.).--MANITOBA BANDINGS, 1954, 1955 and 1956 - WILD AND WILD EXP.*

	Locals				Immatures				Adults				Unknown	Totals
	♂	♀	X	T	♂	♀	X	T	♂	♀	X	T		
Ring-necked Duck														
1954	0	4	0	4	2	4	0	6	0	0	0	0		10
1955	0	0	0	0	1	0	0	1	0	0	0	0		1
1956	0	0	0	0	0	1	0	1	0	1	0	1		2
Sub	0	4	0	4	3	5	0	8	0	1	0	1		13
Amer. Goldeneye														
1955	0	0	0	0	1	0	0	1	0	2	0	2		3
1956	0	0	0	0	0	0	0	0	0	2	0	2		2
Sub	0	0	0	0	1	0	0	1	0	4	0	4		5
Amer. Merganser														
1956	0	0	0	0	1	1	0	2	0	0	0	0		2
Sub	0	0	0	0	1	1	0	2	0	0	0	0		2
W-winged Scoter														
1954	0	0	0	0	0	0	0	0	1	4	0	5		5
148. greater														
1954	0	0	0	0	0	0	0	0	5	0	0	5		5
Sub	0	0	0	0	0	0	0	0	6	4	0	10		10
Ruddy Duck														
1954	7	0	0	7	0	0	0	0	0	1	0	1		8
1955	0	0	0	0	0	0	0	0	0	2	0	2		2
1956	1	0	0	1	0	0	0	0	1	0	0	1		2
Sub	8	0	0	8	0	0	0	0	1	3	0	4		12
Snow Goose														
1955	0	0	0	0	0	0	0	0	0	1	0	1		1
Sub	0	0	0	0	0	0	0	0	0	1	0	1		1
Canada Goose														
1954	0	0	12	12	11	0	0	11	1	0	2	3		26
1955	4	2	0	6	0	0	3	3	0	0	0	0		9
1956	30	31	0	61	10	3	0	13	1	2	0	3		77
Sub	34	33	12	79	21	3	3	27	2	2	2	6		112

TABLE 1C(CON'T.).--MANITOBA BANDINGS, 1954, 1955 and 1956 - WILD AND WILD EXP.*

	Locals				Immatures				Adults				Unknown	Totals
	♂	♀	X	T	♂	♀	X	T	♂	♀	X	T		
Coot														
1954	0	0	39	39	0	0	37	37	0	2	15	17	20	113
1955	0	0	10	10	2	0	203	205	1	0	37	38	13	266
1956	0	0	25	25	0	6	41	47	0	0	16	16	0	88
Sub	0	0	74	74	2	6	281	289	1	2	68	71	33	467
				2,738				6,394				3,001		12,171

TABLE 2

TOTAL BANDINGS

Species	Province	1954	1955	1956	Total	Locals
Mallard	Alberta	1,491	854	876	3,221	2,256
	Saskatchewan	3,715	3,035	6,021	12,771	9,331
	Manitoba	1,393	700	1,045	3,138	462
		6,599	4,589	7,942	19,130	12,049
Black Duck	Alberta	0	0	0	0	0
	Saskatchewan	0	2	1	3	0
	Manitoba	5	2	5	12	0
		5	4	6	15	0
Gadwall	Alberta	75	223	111	409	389
	Saskatchewan	130	465	139	734	690
	Manitoba	45	44	9	98	77
		250	732	259	1,241	1,156
Baldpate	Alberta	359	858	549	1,766	1,126
	Saskatchewan	533	691	687	1,911	1,558
	Manitoba	101	71	73	245	171
		993	1,620	1,309	3,922	2,855
Green-winged Teal	Alberta	209	255	171	635	298
	Saskatchewan	594	357	1,326	2,277	211
	Manitoba	49	52	16	117	33
		852	664	1,513	3,029	542
Blue-winged Teal	Alberta	1,624	2,175	1,544	5,343	2,948
	Saskatchewan	2,758	2,649	4,138	9,545	4,675
	Manitoba	981	1,085	683	2,749	989
		5,363	5,909	6,365	17,637	8,612
Cinnamon Teal	Alberta	0	0	0	0	0
	Saskatchewan	3	0	0	3	3
	Manitoba	0	1	0	1	0
		3	1	0	4	3
Shoveler	Alberta	816	824	429	2,069	1,986
	Saskatchewan	668	798	732	2,198	2,059
	Manitoba	103	92	23	218	138
		1,587	1,714	1,184	4,485	4,183

TABLE 2 (Continued)

TOTAL BANDINGS

Species	Province	1954	1955	1956	Total	Locals
Pintail	Alberta	2,984	2,752	1,981	7,717	2,902
	Saskatchewan	3,611	5,818	5,846	15,275	3,551
	Manitoba	2,043	499	137	2,679	70
		8,638	9,069	7,964	25,671	6,523
Wood Duck	Alberta	0	0	0	0	0
	Saskatchewan	0	0	0	0	0
	Manitoba	1	0	0	1	0
		1	0	0	1	0
Redhead	Alberta	15	22	59	96	80
	Saskatchewan	108	75	68	251	150
	Manitoba	915	463	324	1,702	322
		1,038	560	451	2,049	552
Canvasback	Alberta	19	9	52	80	75
	Saskatchewan	41	80	112	233	221
	Manitoba	267	107	38	412	214
		327	196	202	725	510
Greater Scaup	Manitoba	5	0	0	5	0
		5	0	0	5	0
Scaups	Alberta	132	170	23	325	195
	Saskatchewan	22	323	182	527	472
	Manitoba	142	27	8	177	97
		296	520	213	1,029	764
Ringneck	Alberta	2	12	2	16	9
	Saskatchewan	5	5	39	49	19
	Manitoba	10	1	2	13	4
		17	18	43	78	32
Goldeneye	Manitoba	0	3	2	5	0
		0	3	2	5	0
Bufflehead	Alberta	3	0	0	3	3
	Saskatchewan	0	3	1	4	1
		3	3	1	7	4
White-wing Scoter	Alberta	11	0	1	12	11
	Manitoba	5	0	0	5	0
		16	0	1	17	11

TABLE 2 (Continued)

TOTAL BANDINGS

Species	Province	1954	1955	1956	Total	Locals
Ruddy	Alberta	8	1	2	11	9
	Saskatchewan	0	0	8	8	5
	Manitoba	8	2	2	12	8
		16	3	12	31	22
American Merganser	Manitoba	0	0	2	2	0
		0	0	2	2	0
Canada Goose	Alberta	20	58	61	139	128
	Saskatchewan	248	21	0	269	5
	Manitoba	26	9	77	112	79
		294	88	138	520	212
Snow Goose	Manitoba	0	1	0	1	0
		0	1	0	1	0
Trumpeter Swan	Alberta	0	30	0	30	29
		0	30	0	30	29
Coot	Alberta	40	32	106	178	122
	Saskatchewan	127	235	45	407	222
	Manitoba	113	266	88	467	74
		280	533	239	1,052	418
GRAND TOTAL		26,583	26,257	27,846	80,686	38,477

TABLE 3

BANDINGS OF LOCALS ONLY

Species	Alberta				Saskatchewan				Manitoba				Total
	54	55	56	T	54	55	56	T	54	55	56	T	
Mallard	1,012	562	682	2,256	2,975	2,470	3,886	9,331	136	181	145	462	12,049
Black Duck	0	0	0	0	0	0	0	0	0	0	0	0	-
Gadwall	67	221	101	389	116	457	117	690	37	33	7	77	1,156
Baldpate	260	500	366	1,126	359	666	533	1,558	48	55	68	171	2,855
Green-winged Teal	77	158	63	298	38	61	112	211	19	2	12	33	542
Blue-winged Teal	735	1,605	608	2,948	687	1,799	2,189	4,675	163	467	359	989	8,612
Cinnamon Teal	0	0	0	0	3	0	0	3	0	0	0	0	3
Shoveler	747	812	427	1,986	617	749	693	2,059	40	76	22	138	4,183
Pintail	1,045	1,140	717	2,902	1,593	881	1,055	3,551	21	20	29	70	6,523
Wood Duck	0	0	0	0	0	0	0	0	0	0	0	0	-
Redhead	11	22	47	80	33	69	48	150	125	79	118	322	552
Canvasback	17	7	51	75	36	79	106	221	143	48	23	214	510
Greater Scaup	-	-	-	-	-	-	-	-	-	-	-	-	-
Scaups	20	164	11	195	17	309	146	472	71	19	7	97	764
Ring-necked Duck	0	9	0	9	0	4	15	19	4	0	0	4	32
Goldeneye	0	0	0	0	0	0	0	0	0	0	0	0	-
Bufflehead	3	0	0	3	0	0	1	1	0	0	0	0	4
W. Winged Scoter	11	0	0	11	0	0	0	0	0	0	0	0	11
Ruddy Duck	7	1	1	9	0	0	5	5	7	0	1	8	22
American Merganser	0	0	0	0	0	0	0	0	0	0	0	0	-
Canada Goose	17	52	59	128	5	0	0	5	12	6	61	79	212
Snow Goose	0	0	0	0	0	0	0	0	0	0	0	0	-
Trumpeter Swan	0	29	0	29	0	0	0	0	0	0	0	0	29
Coot	14	29	79	122	12	185	25	222	39	10	25	74	418
TOTALS	4,043	5,311	3,212	12,566	6,491	7,729	8,953	23,173	865	996	877	2,738	38,477

TABLE 4

DISTRIBUTION FROM STRATA TO FLYWAYS
BASED ON DIRECT RECOVERIES

(Accumulated Old & New Cards, Locals and Juvenals)

Species	Strata	Sample	North	U.S.	South	Pacific	Central	Miss.	Atlanti
Mallard	Alta. B.	169	60.3	39.7	----	15.4	15.4	8.3	0.6
	" A	181	48.1	31.5	----	31.5	15.5	4.9	0.0
	Sask. Bw	98	40.8	59.2	----	5.1	21.4	30.6	2.1
	" Aw	660	38.9	61.1	----	5.8	25.2	29.2	0.9
	" Ae	184	44.6	55.4	----	0.0	25.5	28.8	1.1
	Man. A	110	43.6	56.4	----	----	20.0	35.5	0.9
	" B	116	55.1	44.9	----	----	12.9	32.0	0.0
Pintail	Alta. A	232	16.8	74.1	9.1	48.7	17.2	8.2	0.0
	Sask. Aw	197	30.5	60.4	9.1	29.5	21.8	8.1	1.0
	Man. All	109	33.9	63.3	2.8	5.5	25.7	26.6	5.5
Blue-winged Teal	Alta. B	45	51.1	22.2	26.7	----	20.0	2.2	----
	" A	61	34.4	34.4	31.2	1.6	18.0	11.5	3.3
	Sask. Aw	41	29.3	41.4	29.3	----	19.5	21.9	----
	" Be	44	27.3	47.7	25.0	----	9.1	38.6	----
	Man. A	68	22.1	52.9	25.0	----	8.8	42.6	1.5
	" B	79	10.1	65.8	24.1	----	8.9	50.6	6.3
Gadwall	Alta. A	73	31.5	61.7	6.8	9.6	45.2	6.9	0.0
	Sask. Aw	110	28.2	61.8	10.0	2.7	44.6	12.7	1.8
	Man. All	23	26.1	69.6	4.3	0.0	8.7	60.9	0.0
Baldpate	Alta. A	90	18.9	76.7	4.4	70.0	5.6	0.0	1.1
	Sask. Aw	148	13.5	82.4	4.1	43.2	25.0	10.8	3.4
	Man. All	80	23.7	70.0	6.3	2.5	17.5	32.5	17.5
Shoveler	Alta. A	122	13.9	73.0	13.1	57.4	11.5	4.1	0.0
	Sask. Aw	107	20.6	64.5	14.9	31.8	27.1	5.6	0.0
Redhead	Man. All	128	40.0	60.0	0.0	0.0	10.0	44.0	6.0

TABLE 4 (CON'T.)

DISTRIBUTION FROM STRATA TO FLYWAYS
BASED ON DIRECT RECOVERIES

(Accumulated Old & New Cards, Locals and Juvenals)

Species	Strata		Sample	North	U.S.	South	Pacific	Central	Miss.	Atlantic
Canvasback	Man.	A	104	33.7	64.4	1.9	2.9	13.5	28.8	19.2
Scaup	Alta.	B	105	20.0	72.4	7.6	13.3	31.4	22.9	4.8
	"	A	66	65.1	33.4	1.5	9.1	33.3	8.6	0.0
	Sask.	All	49	18.3	79.6	2.1	2.0	38.8	32.7	6.1

TABLE 5

COMPARISON OF 1954 AND 1955 BANDINGS AND RECOVERIES FROM ALBERTA, SASKATCHEWAN, AND MANITOBA

DIRECT RECOVERIES OF WILD LOCALS

Species	Year	Banded	Recovered	%	Distribution		
					Canada	U. S.	South
Mallard	1954	4,123	354	8.6	45.5%	54.5%	0.0%
	1955	3,213	366	11.4	39.2	60.8	0.0
Gadwall	1954	220	21	9.5	28.6	66.7	4.7
	1955	711	64	9.0	12.5	79.7	7.8
Baldpate	1954	667	73	10.9	27.4	65.8	6.8
	1955	1,221	128	10.5	10.2	85.1	4.7
Green-winged Teal	1954	134	9	6.7	11.1	88.9	0.0
	1955	221	9	4.1	0.0	100.0	0.0
Blue-winged Teal	1954	1,585	38	2.4	29.0	34.2	36.8
	1955	3,871	105	2.7	34.3	29.5	36.2
Shoveler	1954	1,404	85	6.1	20.0	65.9	14.1
	1955	1,637	85	5.2	20.0	62.4	17.6
Pintail	1954	2,659	141	5.3	20.6	70.2	9.2
	1955	2,041	130	6.4	34.1	59.7	6.2
Redhead	1954	169	30	17.7	16.7	83.3	0.0
	1955	170	28	16.5	14.3	82.1	3.6
Canvasback	1954	196	44	22.4	29.5	70.5	0.0
	1955	134	38	28.4	21.1	76.3	2.6
Scaup (sp.)	1954	108	12	11.1	25.0	75.0	0.0
	1955	492	27	5.5	29.6	66.7	3.7

TABLE 6

COMPARISON OF MALLARD DISTRIBUTION FROM SASKATCHEWAN - DEGREE BLOCK 51°-109°
(BANDED AS LOCALS AND JUVENALS)

A

YEAR BANDED	TOTAL RECOVERIES	CANADA	DISTRIBUTION OF DIRECT RECOVERIES PACIFIC	CENTRAL	MISSISSIPPI	ATLANTIC
1952	28	43%	14%	7%	36%	0%
1953	53	62	6	17	15	0
1954	122	30	8	33	27	2
1955	198	38	5	25	32	0

DISTRIBUTION BASED ON U. S. RECOVERIES ONLY

B

YEAR BANDED	RECOVERIES IN U. S.	% RECOVERIES IN PACIFIC	% RECOVERIES IN CENTRAL	% RECOVERIES IN MISSISSIPPI	% RECOVERIES IN ATLANTIC
1952	16	25	13	62	0
1953	20	15	45	40	0
1954	86	12	47	38	3
1955	123	9	40	51	0

C

YEAR BANDED	RECOVERIES IN U. S.	% RECOVERIES IN PACIFIC	% RECOVERIES IN CENTRAL-MISSISSIPPI	% RECOVERIES IN ATLANTIC
1952	16	25	75	0
1953	20	15	85	0
1954	86	12	85	3
1955	123	9	91	0

INT.-DUP. SEC., WASH., D.C. 19214

ORIGIN BY DEGREE BLOCKS OF DIRECT RECOVERIES OF LOCALS
(Data for Blue-winged Teal include juvenals considered as locals)

Grid No.1 M A L L A R D
(Actual recoveries for 1953,54,55, plus predicted for 1956

Longitude

Lat	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98
54		ALBERTA					SASKATCHEWAN							MANITOBA				
53			14	12	1	24	0	4	0	2	0	0	0	0	11	1	0	0
52			5	6	1	21	14	39	6	10	3	2	0	1	0	0	0	0
51			21	2	6	19	555	56	7	6	16	35	1	13	2	0	3	0
50			90	15	11	0	3	20	47	40	36	0	6	0	7	31	15	8
49			5	6	0	0	6	15	36	12	3	18	3	28	68	1	0	0

Grid No.2 P I N T A I L
(Banded 1950 - 55 Inclusive)

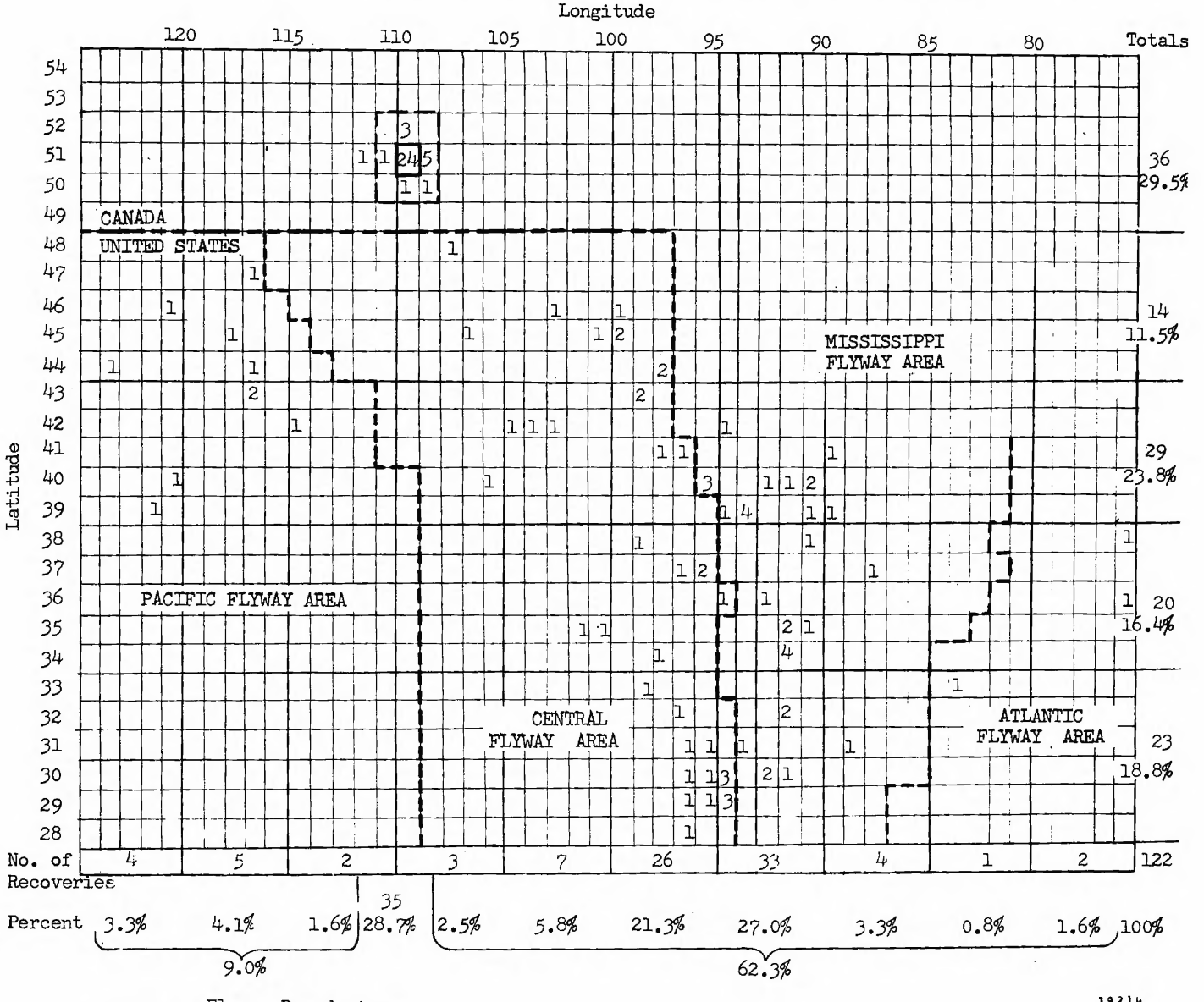
Latitude

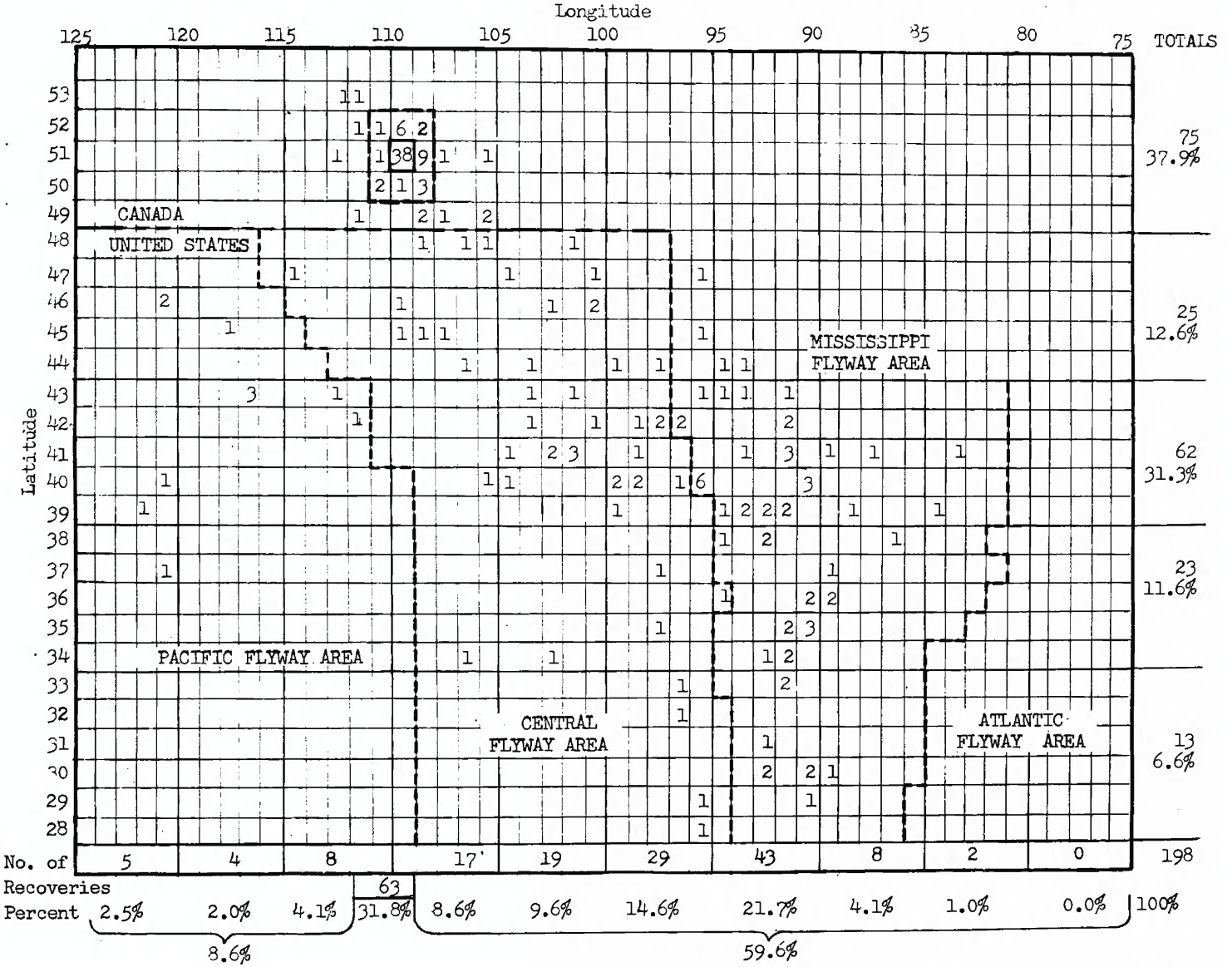
Lat																		
54																		
53			0	0	0	2	0	0	0	0	0	0	0	0	4	0	0	0
52			0	0	2	3	2	6	1	1	0	0	0	0	0	0	0	0
51			18	0	3	5	72	16	4	1	14	14	0	0	0	0	1	0
50			56	21	15		1	9	4	7	6	1	0	0	0	4	4	3
49			13	7	1	0	20	2	12	11	6	20	0	3	9	0	0	0

Grid No.3 B L U E - W I N G E D T E A L
(Banded 1950 - 55)

Lat																		
54																		
53			0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0
52			1	0	6	5	3	1	0	1	0	0	0	0	0	0	0	0
51			6	0	7	12	13	3	0	0	9	37	0	2	0	0	0	0
50			0	12	3		0	3	2	6	2	0	5	2	6	10	16	1
49			0	3	0	0	0	0	3	0	2	0	1	2	6	4	0	0

Grid No. 4.--Direct recoveries of Mallard locals (122) banded in unit 51o-109o in 1954



19214

Grid No. 5.—Direct recoveries of Mallard locals (198) banded in unit 51°-109° in 1955